Project-12

ANNEXURE – 5.5.1

Project Proposal

Title: **Ecology of tigers *(Panthera tigris)* in Pench Tiger Reserves, Madhya Pradesh & Maharashtra.**

Principal Investigators:

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   Wildlife Institute of India
   Dehra Dun.

3. Mr. Qamar Qureshi
   Reader
   Wildlife Institute of India
   Dehra Dun.

4. Dr. Rajesh Gopal,
   Director, Project Tiger, MoEF,
   New Delhi

Collaborating Agencies : i) Project Tiger, MoEF, New Delhi
ii)Madhya Pradesh Forest Department

Study Area : Pench Tiger Reserves, Madhya Pradesh & Maharashtra

Time required to initiate : As soon as the project is approved.

Project duration : 4 Years

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Total cost : Rs. 28,25,350 (Rupees Twenty Eight Lakhs Twenty Five Thousand Three Hundred Fifty Only)

Research Priority Matrix, WII : As per the Research Priority matrix of WII the proposed project covers 1). Priority 1 for ecosystems (Crucial Corridors), 2). Priority 1 for species (highly Endangered), 3). Priority 1 techniques and methodologies (Quantitative evaluation and monitoring of habitats), 4). Priority 1 for people's needs and involvement (interface conflicts) and 5). Priority 1 of special fields.

National Wildlife Action Plan (2002-2006) : The proposed Project addresses priorities II, III and VI in the National Wildlife Action Plan.

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Ecology of tigers *Panthera tigris* in Pench Tiger Reserve, Madhya Pradesh.

ABSTRACT

Increasingly it is being realized that the decline of large carnivores is a global conservation concern. Effective conservation of large predators requires the assessment of complex mix of ecological, ethical and symbolic inter-relationships. The tiger *Panthera tigris tigris* L. is revered as a cultural icon over much of its range and yet has been continually threatened by hunting, habitat loss, fragmentation of populations and most importantly, the depletion of its prey base. Pench Tiger Reserve, which includes Pench National Park and Pench Sanctuary, along with Khana Tiger Reserve constitutes one of the 11 level-I `Tiger Conservation Units' (TCU) in India, where tiger has the highest possibility of survival. Therefore, it is essential that intensive conservation efforts are required in these areas to ensure the long-term survival of tiger population. In view of the above, a four year research project is proposed on the `Ecology of tigers in Pench Tiger Reserve, Madhya Pradesh'. The proposed project aims to collect information on the movement and habitat use by tiger, food habits, population of major prey species, habitat suitability for tiger and its prey and suggest recommendations for the effective management of tiger population in Pench Tiger Reserve and surrounding areas.

1. Introduction

Tiger *Panthera tigris* **L.** distribution has been reduced drastically over the last centaury, including the extinction of three of its subspecies (Bali tiger *P.l.balica*: Caspian tiger *P.t. virgata* and Javan tiger *P.t. sondaica*) and massive reduction in numbers of the rest (Sunquist *et al* 1999). Though tiger has always attracted considerable attention, only a few scientific and long term research has been conducted on the ecology of tiger in India (Schaller 1967, Karanth 1993 and Chundawat *et al* 1999). The paucity of information on the ecology of tiger has been highlighted in the Delhi declaration during

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the International Symposium on Tiger in 1993. Since late Sixties, when tiger's poor status in the wild was recognized, several conservation efforts were launched and a network of Protected Area (PA) exclusively for tiger was identified under the Project Tiger. Yet its status still remains highly threatened in India. The increasing human population, changing land use practices, soaring demands from our urban population and more recently fast expanding economic activity have started straining the delicate balance at which tiger survive. Tiger populations, in most of the protected areas in India face several major problems (Panwar 1982, Panwar 1987, Wemmer *et al* 1987, Karanth 1993, Johnsingh 1983, Seidensticker 1976, Sunquist 1981, Karanth and Sunquist 1992 and Karanth and Stith, 1999). Inadequate size of the protected areas, tiger being a large territorial animal require large spaces and in small and isolated protected areas they frequently venture out and come in direct conflict and experience high mortality. Fragmentation and loss of habitat and its quality usually result in loss of prey availability. Inadequate prey base affect tiger's reproductive success and its survival. More recently poaching for commercial use is a serious threat to tiger population (Kumar and Wright 1999).

Pench Tiger Reserve, which includes Pench National Park and Pench Sanctuary, along with Khana Tiger Reserve constitutes one of the 11 level-I `Tiger Conservation Units' (TCU) in India classified by Wickramanayake *et al*, (1998), where tiger has the highest possibility of survival. Pench is predominantly a dry deciduous system and a fewer studies on tiger ecology have been conducted in these habitats compared to those in tropical and subtropical moist deciduous forests and alluvial tall grasslands (Chundawat, Gogate *et al* 1999). Base line information on tiger and its prey species was collected in Pench National Park by Biswas and Sankar (2002). Intensive conservation efforts are required in these areas to ensure the long-term survival of tiger population. Pench Tiger Reserve, Madhya Pradesh, is one of the important habitats in Central India to study the tiger ecology and its management in the dry deciduous ecosystem. The adjoining forest tract in north and north east boundary of Pench provides crucial corridor linkage to Satpura and thus it is an important link between Satpura and Maikal populations of tiger. Management of tiger population requires information on the demography and on its

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ecology, which would require intensive monitoring. Radio-telemetry will help in gathering information and improve understanding about the reproductive success, dispersal pattern, habitat utilization, home ranges, movement and food habits of tigers and also on the extent and type of direct conflict (Sunquist 1981, Smith 1984). Such information will be useful in targeting special management programmes for the critical tiger habitat.

2. Objectives

1 To collect information on the ranging, movement, home ranges of tigers and their dispersal pattern.

2 To collect information on the habitat use by tiger.

3 To gather information on the food habits of tiger.

4 To assess the population of prey species.

5 To prepare a habitat suitability map for tiger and its prey.

6 To suggest recommendations for the effective management of tiger population in Pench Tiger Reserve and adjoining areas.

3. Project duration. Four Years

4. Study area

The study will be conducted within the Pench Tiger Reserve ($79^0 35'$E to $78^0 55'$E and 22^0N to $21^0 8'$N), Madhya Pradesh. The total area of the Tiger Reserve is 758 km^2 of which the Pench National Park, forming the core zone of the Tiger Reserve, accounts for 292.85 km^2, and the Pench Wildlife sanctuary covers about 118 km^2 (Kumar 1990). The Pench Tiger Reserve shares its boundary with South Seoni Territorial Forests Division on the north and north-eastern sides and on the south with Pench Tiger Reserve Maharashtra. The forest cover in these areas is very similar and is managed as different administrative units by the Madhya Pradesh Forest Department (South Seoni Territorial Division and Pench Tiger Reserve) and Maharashtra Forest Department (Maharashtra Pench Tiger

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Reserve). The total area of the above mentioned continuous forest tract comes to 1,166 sq.km (Sankar *et al* 2001). The river Pench flows through the Park and divides the Pench National Park into western and eastern blocks. It falls under the Biogeographic province 6E the Deccan Peninsula (Rogers and Panwar, 1988). The topography of the park is undulating and falls in the southern reaches of the Satpura ranges. Champion and Seth (1968) describe vegetation of the park as Tropical Dry Deciduous and Tropical Thorn Forests. The mean altitude is around 600 m above sea level. The region experiences a tropical monsoonal climate, with a distinct monsoon (July to September), summer (March to June) and winter (November to February). The average annual rainfall varies from 1300 mm to 1400 mm. The temperature varies from -2^0C in winter to as high as 49^0C in summer (Sankar *et al* 2001). Major ungulates found in the park are gaur (*Bos gaurus*), Sambar (*Cervus unicolor*), Chital (*Axis axis*), Nilgai (*Boselaphus tragocamelus*), wild pig (*Sus scrofa*), muntjac (*Muntiacus muntjac*) and fourhorned antelope (*Tetraceros quadricornis)*. The major predator of the park are, tiger, leopard (*Panthera pardus*), and wild dog (*Cuon alpinus*). There are 99 villages located within five-kilometer radius of the periphery of the Pench Tiger Reserve. No villages are found inside the National Park area.

5. Methods

5.1. Home range evaluation

Home range, daily and seasonal movement of tiger will be determined by using radio-telemetry. Six tigers (2 males, 2 females and 2 sub adults) will be radio collared for this purpose. Radio-locations of each collared animal will be determined by `homing in' and `triangulation' from three to four known reference points (White and Garrot, 1990). Coordinates for the reference point will be determined with the help of Global Position System (GPS). For estimating home ranges, two to three locations every week per collared animal will be recorded. To determine the movement pattern, each collared tiger will be monitored continuously for a week every month.

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5.2. Habitat map and its evaluation

Satellite Imagery (IRS – 1 C, LISS III Digital data) for Pench and adjoining areas is already available in the Institute. A detailed habitat map using remotely sensed data for the study area will be developed. Vegetation of the study area in each habitat type will be quantified by stratified random sampling (Muller-Dombois and Ellenberg, 1974). Random circular plot (10 m radius) will be sampled for vegetation community structure and composition. Information on tree and shrub density, stalking cover, canopy cover, grass height etc., will be collected on each radio-location of tigers. A quantitative assessment of the level of disturbance (wood cutting, lopping, weed abundance, livestock dung) will be made on these sites.

5.3. Food habits

Diet and food preference of tiger will be estimated from the scat analysis and from the kills (Reynolds and Aebischer, 1991, Mukherjee *et al* 1994, Biswas and Sankar 2002, Sankar and Johnsingh 2002, Bagchi *et al* 2003). Scats will be collected from the study area through out the year. All the scats will be washed and oven dried and will be preserved for future analysis. Prey items such as hairs and bone will be used to identify the prey species. For this micro-histological structure of hairs will be used to identify the prey species (Schaller, 1967, Sunquist, 1981; Johnsingh, 1983; Karanth and Sunquist, 1992, Mukherjee *et al,* 1994, Biswas and Sankar 2002, Sankar and Johnsingh 2002, Bagchi *et al* 2003). Radio-collared tiger will be monitored on a daily basis to locate the kill. The following information will be collected on each kill: age, sex and general health condition of the prey species. The kill locations will also be evaluated to determine the characteristics of the preferred kill sites.

5.4. Estimation of major prey species

Information on the availability of the prey species will be estimated through stratified random sampling in each major habitat types identified through the vegetation map. Within each of these strata, population of prey species will be estimated by the Line Transect method (Burnham *et al*, 1980, Khan *et al* 1995, Lancia *et al*, 1994 and Karanth and Sunquist, 1992, Biswas and Sankar 2002, Sankar and Johnsingh 2002, Bagchi *et al* 2003). For this purpose, several permanent line transect will be established proportionately and randomly in each habitat type. Each transect will be walked four to five times every season and information on the number of animal seen, species, sighting angle, perpendicular distance, group size, and age structure and will be collected. This will provide data on the density, demography and distribution of prey species in the study area. Information on health status of prey species in different seasons will be collected by sampling > 30 groups of each prey species.

5.5. Mapping of tiger movement & its prey species distribution with specific reference to anthropogenic pressure zones

The data gathered from the radio-collared tigers and prey species abundance from transects along-with the information acquired of the habitats sampled will be registered in the Geographical Information System (GIS) domain. These different layers will help in generation of the maps for the tiger movement and distribution of its prey species in the Reserve. Anthropogenic data (wood cutting, lopping, grazing, minor forest produce collection etc.,) from the villages in and around the study area will be collected through a questioner survey. Sequentially all the layers will be used in delineating the areas with different levels (ranging from high to low category) of anthropogenic pressures.

The Management Recommendations that are likely to emerge from this proposed study will be of immense use for the park authorities to effectively manage the habitats in Pench Tiger Reserve and surrounding areas.

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6. Literature Cited

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Task responsibilities of the Investigators

Sl. No	Name	Task Responsibilities
1.	Dr. K. Sankar	Overall project co-ordination, field inputs, radio-telemetry work, prey abundance sampling design, data analysis, submission of periodical reports and final project report.
2.	Dr.Y.V. Jhala	Assistance in tiger capture & handling, radio-collaring, overall study design, field inputs, data analysis, submission of periodical reports and final project report.
3.	Mr. Qamar Qureshi	GIS application, overall study design, field inputs, data analysis, submission of periodical reports and final project report.
4	Dr. Rajesh Gopal	Project coordination, facilitate the procurement of permission for tiger radio-collaring, and guidance in management aspect of the project.

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PROPOSED BUDGET

S. No.	Budget Head	Year 1 Rs.	Year 2 Rs.	Year 3 Rs.	Year 4 Rs.	Total Amount (Rupees)
1.	Engagement of two Junior Research Fellows (JRF's) @ Rs. 8,000/- for 1 years and @ Rs. 9,000/- for remaining 2 years as Senior research Fellows (SRF's)	96,000	96,000	1,08,000	1,08,000	4,08,000
2.	Engagement of 3 field assistants @ Rs. 2000/- per month	72,000	72,000	72,000	72,000	2,88,000
3.	Engagement of 1 driver @ Rs. 2200/- p.m	26,400	26,400	26,400	26,400	1,05,600
4.	TA/DA for Researchers	20,000	20,000	20,000	20,000	80,000
5.	TA/DA for the P.I's	60,000	60,000	60,000	60,000	2,40,000
6.	Insurance liability to researchers and field assistants and driver	5,000	5,000	5,000	5,000	20,000
7.	Hiring of accommodation⁺ in Pench for the field station @ Rs. 300/- per month	3,600	3,600	3,600	3,600	14,400
8.	One WII vehicle (Gypsy)* P.O.L., Tire replacement & maintenance	1,80,000	1,80,000	1,80,000	1,80,000	7,20,000
9.	Communication costs (telephone, courier, fax, e-mail, postal charges)	2,500	2,500	2,500	2,500	10,000
10.	Map outputs and reproduction of reports	10,000	10,000	10,000	20,000	50,000
11.	Purchase of 2 binoculars, 2 GPS, 2 Range Finders, 1 Densiometer, Thermometer, Hygrometer and other field equipments.	90,000	-	-	-	90,000
12.	Purchase of 6 Radio-Collars, 2 Receivers, & 2 Antenna	3,02,500	-			3,02,500
13.	Purchase of drugs & accessories for immobilization equipment, payment for veterinary assistance, Purchase of baits, Hiring of camp elephants	80,000	20,000	-	-	1,00,000
14.	Purchase of a desktop computer, printer & UPS for the field station	60,000	-	-	-	60,000
15.	Contingencies, stationary, film rolls, film processing, etc.	20,000	20,000	20,000	20,000	80,000
	Yearly Total	**10,28,000**	**5,15,500**	**5,07,500**	**5,17,500**	**25,68,500**
	10% cost escalation per year	**1,02,800**	**51,550**	**50,750**	**51,750**	**2,56,850**
	Grand Total	**11,30,800**	**5,67,050**	**5,58,250**	**5,69,250**	**28,25,350**

* The Project vehicle of `Dhole Ecology Project' based in Pench Tiger Reserve, M.P., shall be allotted to this proposed project.

+ The WII base of `Dhole Ecology Project' based in Pench Tiger Reserve, M.P., shall be retained for this proposed project.

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Proposed Work Plan

S.No.	Activities	1 Year	2 Year	3 Year	4 Year	5 Year
1.	**Preparatory Activities (purchase of equipments, recruitment of researchers, initiation of field work)**	*				
2.	**Radio-Collaring**	*	*			
3.	**Field Work**	*	*	*	*	*
4.	**Data Analysis**	*	*	*	*	
5.	**Annual Report**	*	*	*	*	*
6.	**Final Report**					*

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PROPOSED REVISED BUDGET

S. No.	Budget Head	Year 1 Rs.	Year 2 Rs.	Year 3 Rs.	Year 4 Rs.	Total Amount (Rupees)
1.	Engagement of two Junior Research Fellows (JRF's) @ Rs. 8,000/- for 1 years and @ Rs. 9,000/- for remaining 2 years as Senior research Fellows (SRF's)	96,000	96,000	1,08,000	1,08,000	4,08,000
2.	Engagement of 3 field assistants @ Rs. 2000/- per month	72,000	72,000	72,000	72,000	2,88,000
3.	Engagement of 1 driver @ Rs. 2200/- p.m	26,400	26,400	26,400	26,400	1,05,600
4.	TA/DA for Researchers	20,000	20,000	20,000	20,000	80,000
5.	TA/DA for the P.I's	60,000	60,000	60,000	60,000	2,40,000
6.	Insurance liability to researchers and field assistants and driver	5,000	5,000	5,000	5,000	20,000
7.	Hiring of accommodation$^+$ in Pench for the field station @ Rs. 300/- per month	3,600	3,600	3,600	3,600	14,400
8.	One WII vehicle (Gypsy)* P.O.L., Tire replacement & maintenance	1,80,000	1,80,000	1,80,000	1,80,000	7,20,000
9.	Communication costs (telephone, courier, fax, e-mail, postal charges)	2,500	2,500	2,500	2,500	10,000
10.	Map outputs and reproduction of reports	-	-		10,000	50,000
11.	Purchase of 2 binoculars, 2 GPS, 2 Range Finders, 1 Densiometer, Thermometer, Hygrometer and other field equipments.	90,000	-	-	-	90,000
12.	Purchase of 6 Radio-Collars, 2 Receivers, & 2 Antenna	3,02,500	-			3,02,500
13.	Purchase of drugs & accessories for immobilization equipment, payment for veterinary assistance, Purchase of baits, Hiring of camp elephants	80,000	20,000	-	-	1,00,000
14.	Purchase of a desktop computer, printer & UPS for the field station	60,000	-	-	-	60,000
15.	Contingencies, stationary, film rolls, film processing, etc.	20,000	20,000	20,000	20,000	80,000
16.	National and International travel for training and participation in conference etc	-	95,816	1,05,016	96,016	2,96,848
	Yearly Total	**10,28,000**	**5,15,500**	**5,07,500**	**5,17,500**	**25,68,500**
	Grand Total	**11,30,800**	**5,67,050**	**5,58,250**	**5,69,250**	**28,25,350**

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